

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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MAR 15 1994

In the Matter of

Amendment of Part 90
of the Commission's Rules
to Adopt Regulations for
Automatic Vehicle Monitoring
Systems

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PR Docket No. 93-61

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

COMMENTS OF AMTECH CORPORATION ON EX PARTE PRESENTATIONS

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SUMMARY

The *ex parte* submissions of Pactel, MobileVision and Southwestern Bell Mobile Services ("SBMS") are largely concerned with issues related to use of the spectrum by wide-area, as opposed to local-area, automatic vehicle monitoring ("AVM") systems -- e.g. methods of sharing by wide-area systems and size of markets for purposes of licensing. AMTECH, a developer of local-area systems, will decline to comment on these aspects of the *ex partes*. AMTECH continues to stand behind its own band plan proposal set forth in its Comments and Reply Comments in this proceeding as the most efficient for overall utilization of the 902-928 MHz band. In AMTECH's plan, the entire band is shared by both wide-area and local-area systems. In two 4 MHz "quiet zones" (906-910 and 920-924 MHz), however, local-area systems are subject to very strict power limits.

There are two issues raised by the recent *ex partes* that are of concern to AMTECH. *First*, PacTel proposes a totally revamped band plan that presents several distinct problems for local-area systems. Although this proposal increases the amount of spectrum for local-area systems relative to the Commission's original proposal -- from 10 to 15.5 MHz -- it is still less than the 18 MHz outside the "quiet zones" available under AMTECH's plan. Moreover, PacTel's plan wreaks havoc with the implementation of *wideband*, high-data local-area systems, such as those contemplated by the California Department of Transportation. Specifically, the plan would accommodate only *one* 6 MHz local-area channel with 10 MHz spacing as compared to the *three* under AMTECH's plan. The availability of three 6 MHz channels would alleviate many severe potential operational problems related to the "single

point of failure" phenomenon. Even if spacing were reduced to 6 MHz between such wideband channels, PacTel's plan would accommodate only two such channels.

With certain modifications, the PacTel plan can be improved:

- Local-area systems should be permitted to attenuate below 912 MHz sidebands of their wide-band emissions that are centered at frequencies above 912 MHz, subject to strict power limits.
- Wide-area AVM narrowband forward links, which PacTel proposes at 924.89-925.39 MHz, should be taken out of the 912-928 MHz sub-band altogether, or placed in the topmost 0.5 MHz of the band (927.5-928 MHz).

Second, the *MobileVision ex parte* seeks an enhanced role for voice communications in wide-area AVM systems. Any such proposal should be rejected. Expanded use of the 902-928 MHz spectrum for these purposes -- far beyond the uses incidental to vehicle location currently authorized -- will unnecessarily imperil the already delicate balance among the various services sharing the band. The net result would be to restrict the amount of spectrum available for local-area systems without adequate foundation. Sufficient provision in the FCC's Rules has already been made for communications that would allow a wide-area system operator to provide voice in conjunction with AVM services: for example, cellular, PCS, trunked radio, and SMRS.

If the Commission adopts a plan similar to that proposed by PacTel, existing local-area systems in the 902-912 MHz band should have to move only after an appropriate transition period in cases of actual interference to wide-area systems. Any wide-area systems seeking such a relocation should pay the local-area system's costs of moving. Local-area systems also should be permitted to install new systems on a secondary basis in the 902-912 MHz band.

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COMMENTS OF AMTECH CORPORATION ON EX PARTE PRESENTATIONS

AMTECH Corporation ("AMTECH"), by its attorneys, hereby files these comments in response to the Commission's February 9, 1994 Public Notice ("Notice")¹ released in the above-referenced proceeding.² In the Notice, the Commission solicits comment from interested parties on recent written *ex parte* presentations submitted by three participants in the proceeding: PacTel Teletrac ("PacTel"),³ MobileVision,⁴ and Southwestern Bell Mobile Systems, Inc. ("SBMS").⁵

¹ *Regulations for Automatic Vehicle Monitoring Systems*, Public Notice, DA 94-129, 59 Fed. Reg. 7239 (Feb. 15, 1994).

² *Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems* (Notice of Proposed Rule Making), 8 FCC Rcd 2502 (1993) ("NPRM").

³ Letter from John R. Lister, President, PacTel Teletrac, to Ralph A. Haller, Chief, Private Radio Bureau dated January 26, 1994 ("*PacTel ex parte*").

⁴ Letter from John J. McDonnell and Marnie K. Sarver, Counsel for MobileVision, to Ralph A. Haller, dated February 1, 1994 ("*MobileVision ex parte*").

⁵ Letter from L. Hoggarth Counsel for SBMS, to William F. Caton, Acting Secretary, FCC, dated February 2, 1994 ("*SBMS ex parte*"). Attached to the *SBMS ex parte* is a report entitled "Capacity and Interference Resistance of Spread-Spectrum Automatic Vehicle Monitoring Systems in the 902-928 MHz ISM Band" prepared by the Mobile and Portable Research Group, Virginia Tech, and dated January 14, 1994 ("*SBMS ex parte Report*").

To a great degree, these *ex parte* submissions discuss issues related to use of the spectrum by wide-area, as opposed to local-area, automatic vehicle monitoring ("AVM") systems -- e.g. methods of sharing by wide-area systems and size of markets for purposes of licensing. AMTECH, a developer of local-area systems, will decline to comment on such exclusively wide-area system matters.

However, two issues raised by these *ex partes* concern AMTECH. First, PacTel proposes a totally revamped band plan with significant implications for the amount of spectrum available to local-area systems. As described below, AMTECH continues to stand behind its own band plan proposal set forth in its Comments⁶ and Reply Comments⁷ in this proceeding as the most efficient for overall utilization of the 902-928 MHz band. Although the new proposal in the PacTel *ex parte* is less desirable than AMTECH's plan from the perspective of local-area systems, with certain modifications the proposal can be improved.

Second, the *MobileVision ex parte* seeks an enhanced role for voice communications in wide-area AVM. Any such proposal should be rejected. Expanded use of the 902-928 MHz spectrum for these purposes -- far beyond the uses incidental to vehicle location currently authorized -- will unnecessarily imperil the already delicate balance among the various services sharing the band. The net result would be to restrict the amount of spectrum available for local-area systems without adequate

⁶ Comments of AMTECH Corporation, PR Docket No. 93-61 (filed June 29, 1993) ("AMTECH Comments"). A schematic diagram of the plan is attached hereto as "Figure 1."

⁷ Reply Comments of AMTECH Corporation, PR Docket No. 93-61 (filed July 29, 1993) ("AMTECH Reply Comments").

justification, as wide-area AVM systems have several viable options for voice already at hand.

I. AMTECH'S BAND PLAN PROPOSAL REMAINS THE MOST EFFICIENT AND WILL BEST SERVE THE PUBLIC INTEREST

In its Comments and Reply Comments submitted earlier in this proceeding, AMTECH set forth a band plan, Plan B (see attached Figure 1), carefully crafted to meet the needs of the proponents of both wide-area and local-area AVM systems and location and monitoring services ("LMS").⁸ Briefly, AMTECH proposes that the entire 902-928 MHz band be shared by both wide-area and local-area AVM systems, as is currently the case in the two sub-bands in which AVM has been allocated spectrum (904-912 and 918-926 MHz). However, in recognition that some wide-area systems have indicated a need for spectrum bereft of local-area systems operating at full power,⁹ AMTECH proposed the creation of two 4 MHz "quiet zones" at 906-910 and 920-924 MHz in which local-area operations would be permitted, but subject to strict power limitations. The size of the "quiet zones" was dictated by the submissions of PacTel, MobileVision, and SBMS, all of whom admitted that 4 MHz of contiguous spectrum would accommodate their systems as currently designed.¹⁰

⁸ Amtech Comments at 17-28; AMTECH Reply Comments at 6-7, 9-12.

⁹ As AMTECH explained in a paper filed with the Commission in this docket on February 2, 1994, optimum performance of AMTECH-equipped systems requires that the power used be neither too small *nor too great*. See AMTECH Corporation, "Factors Affecting Power Level and Spectrum Requirements for AMTECH-Equipped Automatic Vehicle Monitoring Systems," dated February 2, 1994, at 2-9.

¹⁰ See *id.* at 6-7 & nn. 13-15, and filings of PacTel, SBMS, and MobileVision cited therein.

AMTECH's band plan would therefore make available the spectrum the wide-area proponents have indicated they require while better accommodating the needs of local-area systems for adequate frequencies.¹¹ As AMTECH and others explained earlier, for example, multi-lane toll plazas in the country's most congested areas require numerous reader frequencies for successful operation.¹² If wide-area systems were to have exclusive access to over 60% of the 26 MHz AVM band, as the *NPRM* proposes, then successful local-area operation at such locations would be rendered considerably more difficult. Moreover, new local-area systems are being developed, such as those to be implemented by the State of California, in which 6 MHz channels will be utilized for high data rate read-write operations. Such a system will require a band plan capable of accommodating at least three such channels in close physical proximity.¹³ AMTECH's band plan would satisfy the needs of such systems by

¹¹ As in its Comments and Reply Comments, AMTECH continues to have no objection to wide-area systems sharing the spectrum available to local-area systems pursuant to the sharing guidelines of Section 90.173(b) of the Commission's Rules. Indeed, since AMTECH filed its Reply Comments, it and Pinpoint have conducted sharing tests in the Washington D.C. area which convincingly support AMTECH's confidence that local-area and wide-area systems can share the same spectrum with minimal interaction between systems. See Hatfield Associates, Inc. "Review and Discussion of the Pinpoint ARRAY™ Network and Its Performance," at 6-1 to 6-3, filed as an *ex parte* presentation in PR Docket No. 93-61 on January 24, 1994. However, AMTECH submits that in cases where relocation of a local-area installation to a new frequency is the mutually acceptable solution to instances of actual interference to a wide-area system, such relocation should be at the wide-area systems' expense.

¹² AMTECH Reply Comments at 23; Comments of the Interagency Group, PR Docket No. 93-61, at 4 (filed June 29, 1993).

¹³ Comments of the California Department of Transportation, PR Pocket No. 93-61, at 6 (filed June 28, 1993); Comments of Texas Instruments, Inc./MFS Network Technologies, Inc., PR Docket No. 93-61, at 14-15 (filed June 29, 1993) ("Comments of TI/MFS"). AMTECH Comments at 10.

permitting three channels with center frequencies spaced 10 MHz apart.¹⁴ Were the 904-912 and 918-926 MHz bands to be set aside solely for wide-area system use, then only one such channel would be available.

Nothing in the *ex partes* put on public notice undermines the soundness from a technical or public policy perspective of such a band plan. Indeed, PacTel in its *ex parte* now calls for the sharing of spectrum by wide-area systems to at least a limited extent on a time-shared basis.¹⁵ If time-sharing is available, as Pinpoint Communications, Inc., has previously argued in this proceeding, then the "quiet zones" suggested by AMTECH could be shared by several wide-area systems, alleviating any concerns that SBMS has about limiting the number of wide-area AVM systems arbitrarily to two.¹⁶

¹⁴ Indeed, the AMTECH Plan B (see attached Figure 1) could accommodate four 6 MHz channels with center frequencies spaced 6 or 7 MHz apart: centered at 905, 912, 918, and 925 MHz. Of course, the sidebands of these channels overlapping the two "quiet" zones would be subject to the power level restrictions AMTECH has discussed earlier. AMTECH notes that while four channels might be accommodated in this manner, they would be subject to read filtering that would reduce the range of such operations appreciably. The reason for this is that the reader-to-tag transmission must be wide enough to preserve modulation fidelity but narrow enough to minimize interference to nearby reader tag operations. Readers in close proximity (adjacent lanes at a toll booth, for example) will produce signals that are about 50 dB greater than the reflected signals from tags. To permit multiple readers to operate simultaneously in close proximity, the center frequencies of the readers must be sufficiently separated to allow filtering. The reader receive filter response must be down by 50 to 60 dB at the frequency of the center frequency of a nearby reader. Thus, the bandwidth must be as wide as possible to preserve waveform modulation yet of minimum width to limit noise and permit close channel spacing. At a separation of 6 MHz, as opposed to 10 MHz, preservation of the waveform with sufficient filtering requires about a 5 dB stronger reflected tag signal which can only be achieved through a reduction in reading range.

¹⁵ *PacTel ex parte* at 2.

¹⁶ See, e.g., Supplement to Reply Comments of Southwestern Bell Mobile Systems, Inc., PR Docket No. 93-61 (filed Oct. 15, 1993), consisting of a paper entitled "Competition in Wideband Location Monitoring Services" by Leland L. Johnson.

In their earlier comments, MobileVision and PacTel indicated that their systems require only 4 MHz of spectrum to operate.¹⁷ MobileVision has not provided any new information in its *ex parte* to rebut this fact. However, MobileVision does place a new and increased emphasis on voice operations by wide-area AVM systems in an apparent effort to secure at least two 8 MHz-wide sub-bands for wide-area systems only. In AMTECH's view, the desire for voice operations in conjunction with AVM does not justify the sort of band plan that MobileVision seeks.

The Commission has allocated spectrum for voice operations in numerous other parts of the spectrum that is available to MobileVision on a continuous basis in conjunction with its AVM service. Indeed, MobileVision effectively concedes this point by alluding to the integration of cellular with GPS in its *ex parte*. Because cellular service is available on a common carrier basis, a similar integration could occur between AVM and cellular if MobileVision chooses. Further, there are other private radio services -- conventional, trunked, and Specialized Mobile Radio -- that could be used to complement AVM services -- as well as the newly established personal communications services. Thus, there is no justification for structuring the 902-928 MHz bandplan to accommodate voice in the way MobileVision now demands. Rather, the band plan should recognize the unique value of this band for a variety of

¹⁷ Comments of MobileVision, PR Docket No. 93-61 at 36-40 (filed June 29, 1993) (8 MHz signal contains sidelobes that are superfluous to central 4 MHz of signal); Comments of North American Teletrac and Location Technologies, Inc., PR Docket No. 93-61, at 24 n.27 (filed June 29, 1993) (only 4 MHz necessary for current operations).

AVM systems and be structured accordingly.¹⁸ At the most, voice communications incidental to vehicle location should be permitted only on the narrowband forward link channels sought by PacTel, MobileVision, and SBMS.

Raising concerns somewhat similar to those engendered by MobileVision's emphasis on voice operations is PacTel's proposal for exclusively allocated wideband forward links for wide-area systems. These forward links, mentioned for the first time in PacTel's *ex parte*, are not supported by PacTel's comments in this docket. Indeed, until their recent *ex parte* submission, there did not appear to be the need for such links. A close reading of the *PacTel ex parte* reveals that the functions to be carried out on these wideband links appear fully accommodated by the shared wide-area channel or the narrowband forward links.¹⁹ PacTel has submitted no new data that would explain this new requirement for wideband forward links. Further, no other proponent of wide-area technology has even mentioned a need for separate, wideband forward links.²⁰ Thus, PacTel's desire for exclusive wideband forward links does not

¹⁸ The role that MobileVision envisions for voice goes far beyond that contemplated by the current interim AVM rules and those proposed by the FCC. *Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems*, Notice of Proposed Rulemaking, 8 FCC Rcd 2502, 2503 (1993) ("The use of non-voice signalling methods from and to radio units to make known the location of such units. LMS systems may also transmit and receive status and instructional messages related to the units involved.")

¹⁹ In its *ex parte*, PacTel indicates that the wideband forward links would be used as control stations, for "forward links," for mobile non-emergency transmissions, and for emergency voice communications. *PacTel ex parte*, attachment at (1). However, a careful review of the *ex parte* demonstrates that each of these functions will also be supported by narrowband forward links (as in all earlier PacTel filings) or the shared band (904.0-910.5 MHz), or both. *Id.*

²⁰ Exclusive wideband forward links may have the effect of artificially limiting the number of its competitors severely despite the adoption of time-sharing, possibly creating a spectrum windfall for PacTel.

offer sufficient reason to undermine the two 4 MHz "quiet zones" band plan proposal put forth by AMTECH in its Comments and Reply Comments.

II. PACTEL'S *EX PARTE* BAND PLAN PROPOSAL IS AN IMPROVEMENT OVER ITS EARLIER POSITION

In its *ex parte*, PacTel sets forth a new band plan apparently predicated on sharing of a 6.5 MHz sub-band between two wide-area systems. Specifically, PacTel proposes that the 902-912 MHz and 924.89-925.39 MHz sub-bands be set aside for wide-area systems, with 904.0-910.5 MHz to be shared, and that the remainder of the 902-928 MHz band be available to local-area systems.²¹

This band plan presents several distinct problems for local-area systems. It is true that PacTel's new proposal increases the amount of spectrum for local-area systems over the Commission's *NPRM* from 10 to 15.5 MHz -- nearly equal to the 16 MHz currently available to local-area AVM systems -- thereby going a long-way toward alleviating the concerns of the AVM industry and users about sufficient reader frequencies. However, PacTel's plan wreaks havoc with the implementation of wide-band local-area systems, such as those contemplated by the California Department of Transportation ("Caltrans"). Specifically, the plan would accommodate only *one* 6 MHz local-area channel with 10 MHz spacing²² as compared to the *three* under AMTECH's band plan proposal. For example, if one such channel is placed at 912-

²¹ *PacTel ex parte* at 1; *id.*, attachment at (3).

²² See note 14 *supra* for discussion of desirability of 10 MHz spacing of 6 MHz wideband local-area systems.

918 MHz, ten MHz separation would require the second channel to be centered at 925 MHz, right on top of PacTel's proposed *third* set of forward links. As AMTECH explained in its comments, the availability of three 6 MHz channels would alleviate many severe potential operational problems related to the "single point of failure" phenomenon.²³ Even if spacing were reduced to 6 MHz between local-area wide-band channels, only two such channels could be accommodated under PacTel's new plan.

However, with certain modifications, the PacTel band plan could be made acceptable for most potential local-area applications. PacTel's proposal however is not preferable to AMTECH's own proposal as it more severely limits the number of frequencies available for local-area systems and thereby the flexibility in frequency selection for all types of such systems. First, AMTECH seeks rules allowing local-area systems to attenuate side-bands of wideband emissions centered at frequencies above 912 MHz into the spectrum below 912 MHz. This would allow a local-area operator to place a 6 MHz wideband channel at 913 MHz, for example, and attenuate the bottom two MHz of the channel in the 912-910 MHz sub-band. Consistent with its own "quiet zone" proposal,²⁴ AMTECH suggests that if the PacTel band plan is adopted, that local-area systems be able to attenuate side-bands in the 909-912 MHz

²³ AMTECH Comments at 10-11; Comments of TI/MFS at 14-15.

²⁴ See AMTECH Comments at 30-31; *id.*, Appendix C at C-8, C-9.

band so that the effective radiated power of emissions falling into band is limited to the following:²⁵

1. In the 909-912 MHz sub-band, sideband emissions from local-area mobile units would be limited to 50 mW ERP.
2. In the 909-911 MHz sub-band, sideband emissions from local-area base stations (readers) would be limited to 50 mW ERP.
3. In the 911-912 MHz sub-band, sideband emissions from local-area base stations would be limited to 200 mW ERP.

Second, as the record developed in this rulemaking demonstrates, the placement of wide-area system narrowband forward links in the vicinity of 925 MHz is needlessly disruptive to other licensed users of the band.²⁶ Accordingly, the forward links should either be moved out of the 902-928 MHz band altogether, should be moved into the wide-area only sub-band (902-909 MHz), or -- and least preferably -- should be moved to the top most 0.5 MHz of the 902-928 MHz band, as SBMS proposes in its *ex parte*. At 927.5-928.0 MHz, the forward links should pose considerably less potential harm to the local-area operations of AMTECH and others and vice versa than at the location proposed by PacTel.

With these two modifications, the PacTel proposal would accommodate the three 6 MHz wideband local-area channels required in the 902-928 MHz sub-band:

²⁵ Unlike AMTECH's plan, this recommendation does not envision signals from new stations being centered in the 909-912 MHz band in a co-primary basis but would permit emissions centered outside of 909-912 MHz to "fall off" within that sub-band at the power levels noted above. As explained below, AMTECH seeks the ability of *new* local-area systems to operate in the 902-912 MHz sub-band on a secondary basis.

²⁶ See AMTECH Reply Comments at 33 and nn. 82 & 83 and comments of other parties cited therein.

centered at 913, 919, and 925 MHz.²⁷ While these channels would have to employ considerable filtering of the signal being read in order to operate with this reduced degree of frequency separation (a technique that will adversely affect the range of such local-area operations²⁸), AMTECH could find this compromise acceptable.

One final note with regard to band plan proposals in the recent *ex partes*: AMTECH notes that SBMS, in its *ex parte*, changes its earlier bandplan proposal to provide for wide-area-only "carve outs" in the 906-914 and 916-924 MHz sub-bands, rather than 904-912 and 918-926 MHz. This revised proposal, offered without any rationale for its differences from SBMS's earlier pleadings, is *the most deleterious* that has been put forth in this proceeding. Not only does it offer insufficient spectrum -- 9 MHz when the side-area AVM forward links located at the band edges are taken into account -- for local-area systems generally, but it renders impossible, on any scale, Caltrans-type, high data operations, as the maximum bandwidth for local-area systems is reduced to 3.5 MHz.²⁹

²⁷ AMTECH also urges the Commission to make accommodation in its rules for at least one, and preferably two, 6 MHz highway beacon channels in the 912-928 MHz band if it adopts a band plan similar to PacTel's. Such beacons would be used to locate and monitor vehicles on a multi-lane highway in the vicinity of the beacon, as well as transmit information to passing vehicles. Beacons should be permitted to operate at up to 100 watts ERP. Beacon power could be adjusted downward to accommodate actual installations. See AMTECH Comments, at 18 n.34 for a fuller description of highway beacons. See also *id.*, Appendix C at C-8 (proposed rules for highway beacons).

²⁸ See note 14 *supra*.

²⁹ See Comments of Hughes Transportation Management Systems, PR Docket No. 93-61, at 3-5 (filed Feb. 25, 1994) (SBMS's unexplained departure from its earlier proposals "ignores the fact that many local-area technologies rely on wideband signals for effective communications.")

III. EXISTING LOCAL-AREA SYSTEMS SHOULD HAVE TO MIGRATE ONLY IN CASES OF ACTUAL INTERFERENCE TO WIDE-AREA SYSTEMS AND AS A LAST RESORT

In its Comments, AMTECH explained that existing local-area systems should have to migrate out of the quiet zones or any wide-area only spectrum only in case of actual interference. Approximately one-thousand local-area readers, a majority of them utilized by this nation's railroads, are already serving hundreds of thousands of vehicles in the 904-912 MHz band. Indeed, under the AVM standard adopted by the Association of American Railroads ("AAR") in 1991,³⁰ the railroads have been installing the majority of their readers in the existing AVM allocation at 911.5 MHz, with most of the remainder at 918.5 MHz. A requirement for the railroads, most of whose installations are in rural areas far from probable wide-area system sites, and other users of local-area AVM systems to migrate out of the 904-912 MHz sub-band, regardless of whether interference actually occurs, will require the expenditure of hundreds of thousands or millions of dollars needlessly, and cause considerable disruption.

Accordingly, if the Commission adopts PacTel's segregated band plan proposal as modified by AMTECH's recommendations, then existing local-area systems should be able to continue to operate at their current locations indefinitely on a co-primary basis with wide-area systems. If cases of actual interference between wide-area and "grandfathered" local-area systems arise, the parties should be required to resolve the

³⁰ Association of American Railroads, Specification for Application of Automatic Equipment Identification Transponders on Freight Cars, S-917-92 (rev. ed. May 1, 1992) ("AAR Specification").

situation as set forth in explicit AVM/LMS sharing guidelines.³¹ Any wide-area operator ultimately demanding the relocation of a local-area system should be required to pay the local-area operator's costs of migration to the new frequency.³² Wide-area licensees could remain free to attempt to persuade local-area systems to move to different frequencies absent actual interference or at any time. As an alternative, the Commission could locate the boundary between the wide-area and local-area sub-bands at a frequency less than 911.5 MHz, in order to protect the hundreds of railroad reader installations operating at that frequency and the many other local-area system readers installed at 911.99 MHz under the current rules.

Once new AVM rules go into effect, authorization of local-area-systems in the 902-912 MHz sub-band should be permitted on a secondary basis to wide-area systems, albeit primary to other users of the band. The resulting flexibility would be especially helpful to the railroads, for example, which could continue to implement many remote locations at 911.5 MHz, as well as 918.5 MHz (in accordance with the AAR Specification), where at least two readers are required.

IV. CONCLUSION

In conclusion, AMTECH urges the FCC to adopt the band plan AMTECH described in its Comments and Reply Comments in this proceeding. In the alternative,

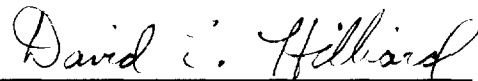
³¹ See note 11 *supra*.

³² See AMTECH Comments at 36-38; AMTECH Reply Comments at 37-38 and nn. 96 & 98.

were the Commission to consider the band plan filed by PacTel in its *ex parte*, then AMTECH urges the FCC to adopt its modifications to that plan so as to accommodate better the diverse needs of local-area systems without compromising the capabilities of wide-area systems.

Respectfully submitted,

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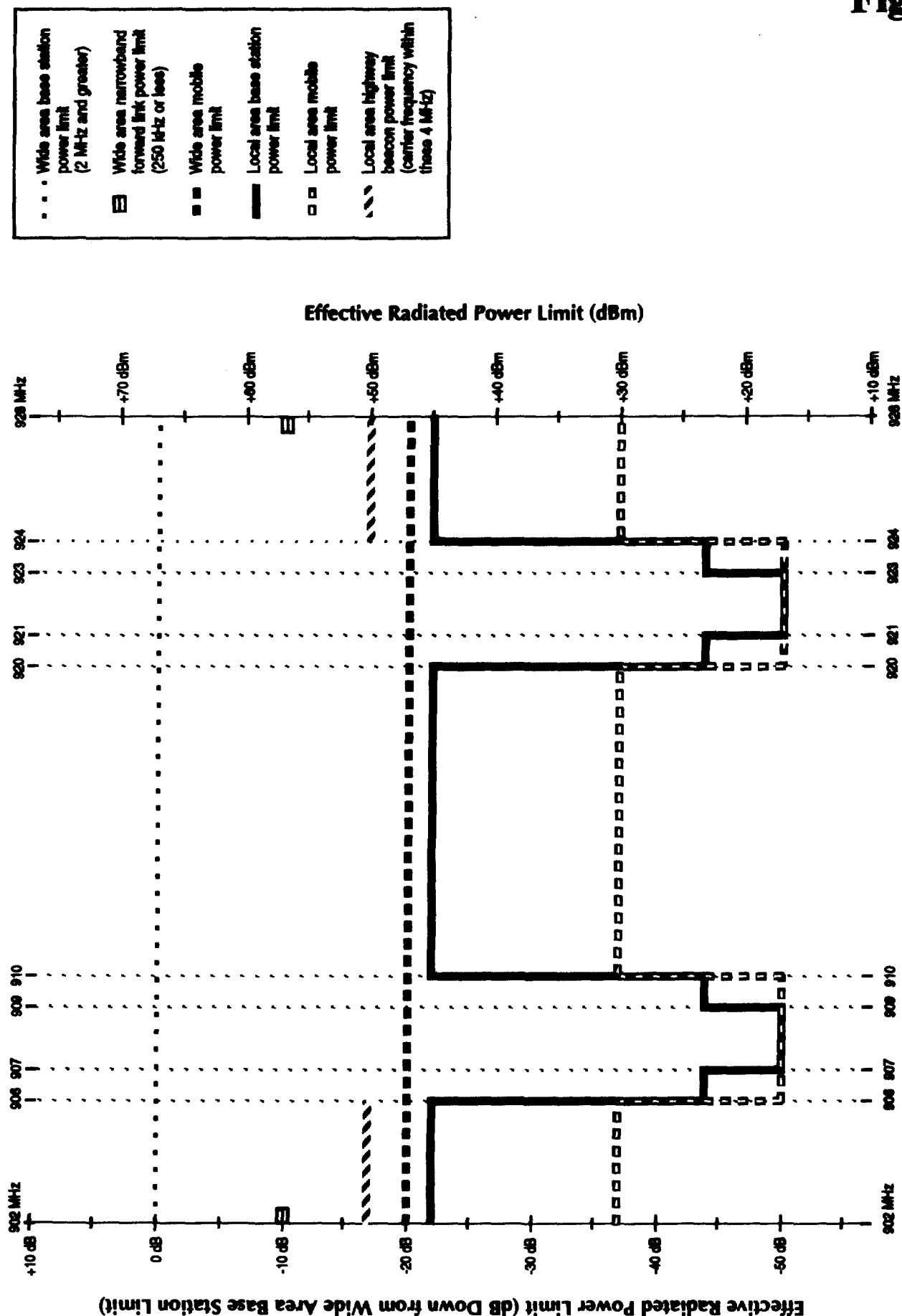
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March 15, 1994

Figure 1



AMTECH Plan B: Proposed Power Limits for LMS Systems in the 902-928 MHz Band